**Foundations of R Software**
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**Lecture - 50**
**Graphics: Sub - divided Bar Plots and Pic Diagrams**

Welcome to the course Foundations of R Software and you can recall that in the last lecture we initiated a discussion about how to create different types of Graphics in the R software and we had understood how we can create the bar plot and scatter diagram. And when I talked about the bar diagram then I had explained you that there are different options which are available in these graphics, which can be used to enhance the information and the look of the graphic in the way you want.

So, continuing on the same line in this lecture, we are going to consider here one more topic one more graphic, which is an extension of the bar plot that is sub divided bar plot and after that I will try to give you some information about the pie diagram. You know all these graphics you know at least both these graphics you know you have seen them many times in the books magazine etcetera. So, now, my objective here in this lecture is how you can create these graphics under the R software. So, let us begin our lecture.

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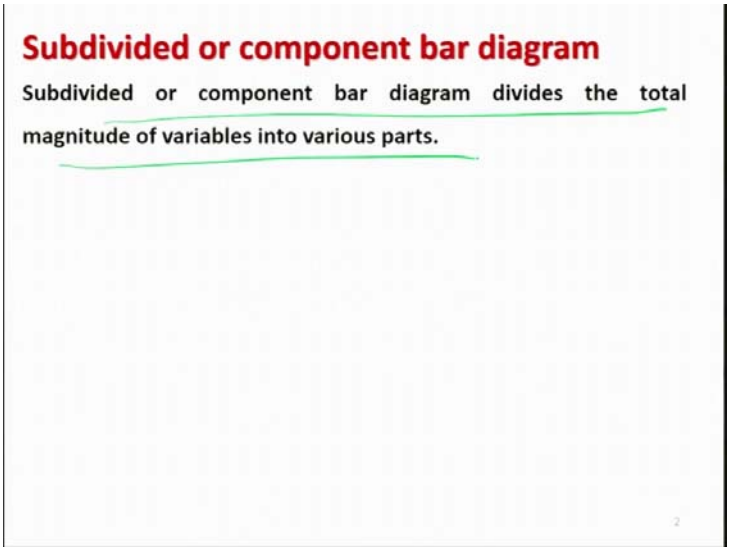

So, the first question comes here what is the sub divided or component bar diagram, right. So, this subdivided or component bar diagram they try to divide the total magnitude of the variables into various parts, right.

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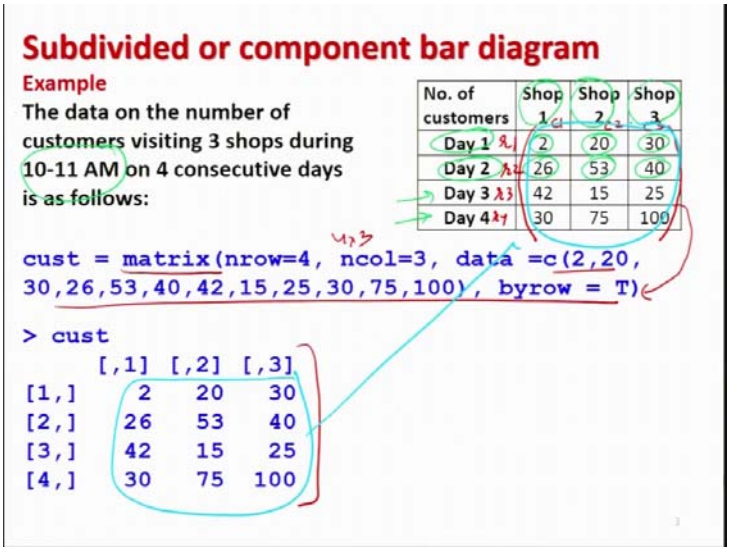


Let me try to take here an example and try to show you that what is the meaning of this subdivided or component bar diagram and how can you create it.

So, suppose there are 3 shops shop number 1, shop number 2 and shop number 3 and different number of customers are coming to the shop on different days and the number of customers arriving on 4 days that is recorded so on day 1 shop 1 had 2 customers, shop 2 had 20 and shop 3 had 30 on day 2 the shop number 1 had 26 customers, shop 2 has 53 and shop 3 has 40 and so on.

And similar is the record for day 3 and day 4, right. So, all these customers they are visiting the shop during 10 to 11 AM, right on 4 consecutive days. So, now, the question is I want to create here a subdivided or component bar diagram, right. So, in order to create bar diagram the first condition is that the input data has to be given in the form of a matrix.

So, I would say here the way you are trying to look at this data just try to consider this as a matrix. So, this is your here row 1, this is row 2, this is row 3 and this here row 4 and this is your here column 1, this is column 2 and this is here column 3 now you have to

write all these values in the form of a matrix and that is going to work as an input of your sub divided bar diagram.

So, if you try to see I am simply trying to use here the command here matrix and I try to create here a matrix of order 4 by 3, where the data is given in this order and the data is arranged by row. So, finally, you get here a matrix say like this. So, if you try to compare here this part with here this part both are going to be the same, right.

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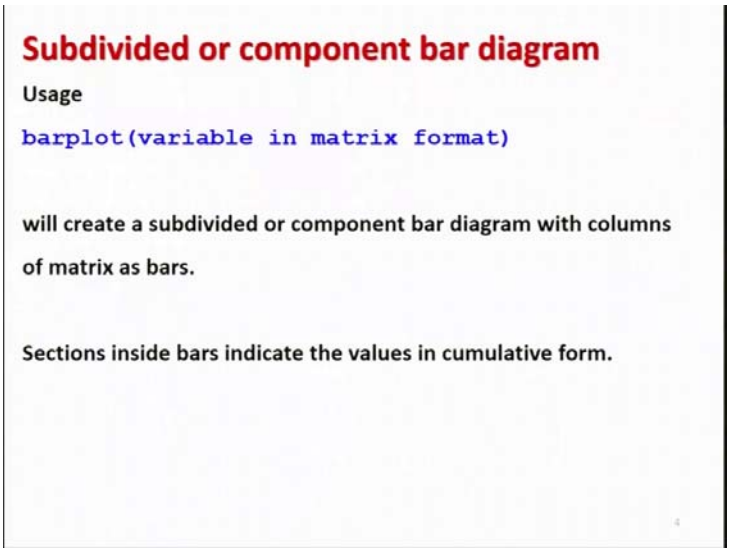


So, and now you know how to enter the data into a matrix and then I try to use here the command same command what we have used earlier bar plot, but now I try to give the variable here in the matrix format and this is going to create a subdivided or component bar diagram where the columns of the matrix are going to be indicated as a bar. And these sections inside the bar indicate the values in the cumulative form. What does this mean? I will try to show you with this example.

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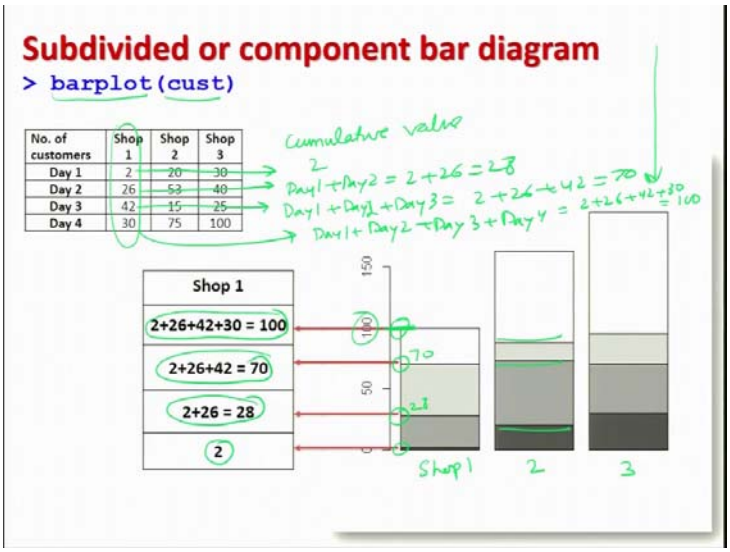


So, if you try to see here this is your here subdivided or component bar diagram what it means and how it is indicating different type of information that is what we have to now understand. So, if you try to look here this was your here matrix c u s t cust and now you are trying to use here the command bar plot and inside parenthesis c u s t.

So, this is the data which is here in this matrix, right. If you want to see here what are the cumulative values for this day 1 for this shop number 1 if you try to consider this data, the first cumulative value is here 2; on the 2nd day the total number of customers which arrive in the shop on day 1 and day 2 day 1 plus day 2 it is equal to here 2 plus 26 28.

Then on the day 3 this cumulative number of customers are going to be the customers which who visit on day 1, day 2 and day 3 which is equal to here 2 plus 26 plus 42 equal to here 70. And similarly on the 4th day this cumulative value is going to be day 1 plus day 1 plus day 2 plus day 3 plus day 4 and this is going to be here sum of all the values 2 plus 26 plus 42 plus 30, which is equal to here 100, right.

So, these values are actually plotted in the bars and the section inside the bars they are divided according to the days. So, if you try to see here this is what I have written here these cumulative totals on day 1, this is on day 1 plus day 2, this is day 1 plus day 2 plus day 3 and day 1 plus day 2 plus day 3 plus day 4.

So, if you try to see here in this bar this height is the maximum value which is the cumulative or the total of all the observations. So, there are 100 customers in the shop 1. So, this is here 100 and now how these customers have been distributed among all the days that is indicated here.

So, this is here the value 2 for the day 1, this is here the value 28 for the day 1 plus day 2 and this is here the value here 70 which is here day 1 plus day 2 day 3 and this is here the day 1, day 2, day 3 per day 4. So, if you try to see the bar has been divided into different components here and in this case for example, this bar belongs to the correspond to the shop 1, this is for shop 2 and this is for shop 3. So, looking at this height 1 can see here that how many customers visited the shop on day 1 or day 1 plus day 2 or day 1 plus day 2 day 3 and so on.

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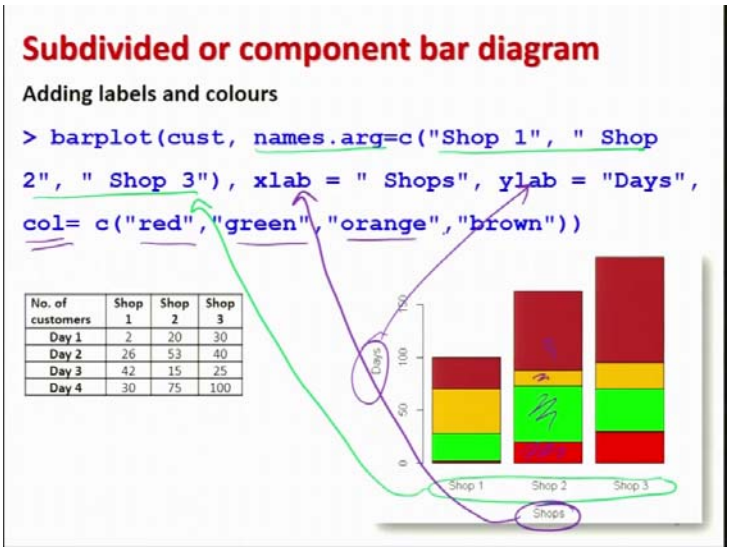


So, this is actually the subdivided bar plot and now if you want to make here some cosmetic changes for example, if you want to write down here name for these bars you can use here the option names dot arg and you can draw, right down here shop 1, shop 2, shop 3. So, you can see here this is going to be printed here.

Similarly, if you want to write down here say shops here you have to give here xlab and if you want to give here days you have to give here in the ylab and similarly if you want

to change the color of this sub divisions you have to give them under the option here col and you have to just separate all the colors within the double quotes by comma.

Say for example, here I have given here red, green, orange, brown the first here is red, green, orange and here brown, right. So, this is how you can add the labels and colors to this subdivided bar diagram also, right. So, why not to take here some why not to execute this example on the R console and try to see what do we get here? So, first let me try to create this data value here.

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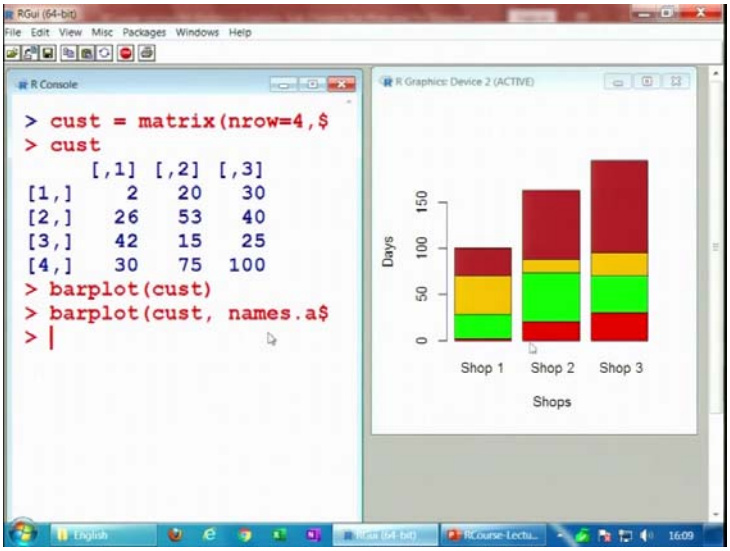


So, you can see here this is my data matrix and now if you try to say here bar plot see here say customer which is cust you can see here this matrix or this bar plot will come here. Now in case if you want to change here this labels colors etc. So, you have to just give here these options here and you can see here you get here this graph. So, you can see here it is not a very difficult job to construct such graphs in the R software, right.

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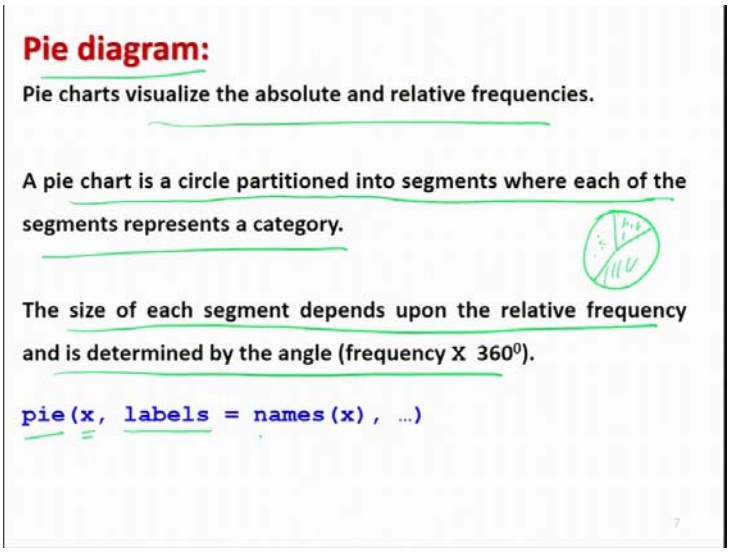


So, now after this we consider another very popular graphics which is pie diagram, right. So, this charts or pie diagram they also visualize the absolute and relative frequencies just like the bars, right, but the only difference is that in the case of bar diagram we try to create a bar, but in the case of pie diagram we try to create a pie diagram which is a circle in which the partitions, which are created and partitions are created into segments where each of the segments represent a category just like in the bar plot the bar is going to represent a category here.

In this case you have a circle like this you try to create a segment and each of this segment, they try to indicate here a category. The size of this e segment depends upon the relative frequency and it is determined by the angle like as here frequency into 360 degree, right.

So, you have to be watchful when you are trying to interpret it now. I am sure that you all know about this pie diagram. So, I will not go into more details, but in the R software how you can create the R diagram is as follows. Simply use here the command p i e pie inside the parenthesis try to write down here the data and then you have to give here labels where you can give it the names which can be there.

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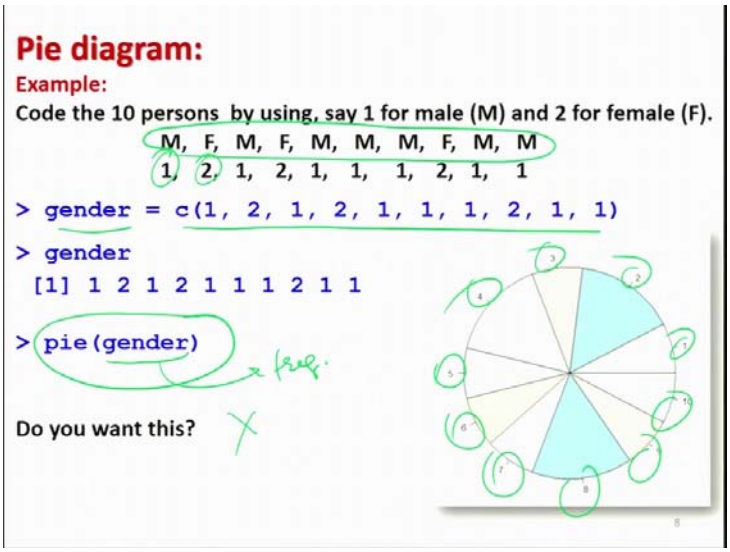


So, why not to take here one example and try to understand this that how they can be created? And my idea is very simple means, I can take another example also, but my idea is that when you are trying to compute or you are trying to create the graphics on the same data set in different ways possibly you can easily understand what is the difference among these different types of graphic in the way they try to present the information.

So, I try to consider here the same data in which we have the data on 10 persons on their gender as male or females males are indicated by 1 and females are indicated by 2 and then I try to collect the data in the variable here gender like this and then now I try to create here a pie gender; that means, try to write down the command here p i e you can see here now this you get here this type of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10; 10 partition do you want this no.

So, once again I have made here a mistake that instead of giving here the frequency of the data I am trying to give the original data that is why it is creating this type of issue. So, we have to give here the frequency, right.

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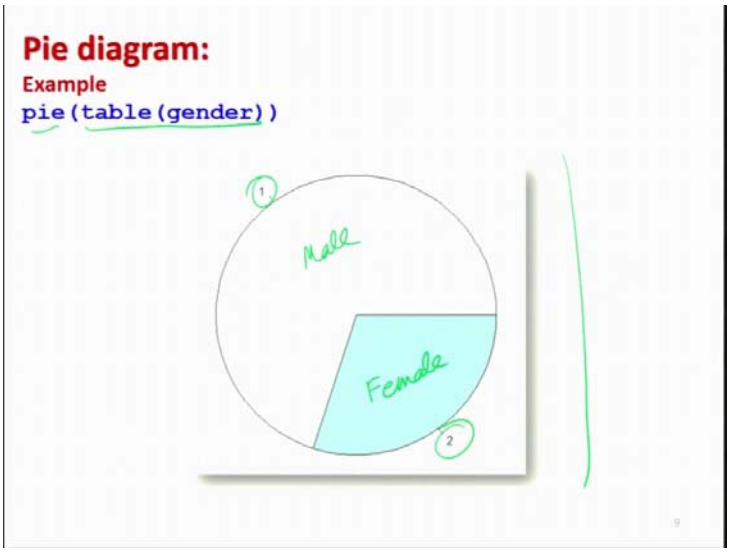


So, in order to use the frequency exactly in the way we have used it in the bar plot we have to use here table gender.

So, now if you try to use here pie over this table gender you get here this graph very clearly this is your here category 1, this is your here category 2, this is for here male and this is for here female. You can see here it is not a very difficult thing to create such a graphic now, right.

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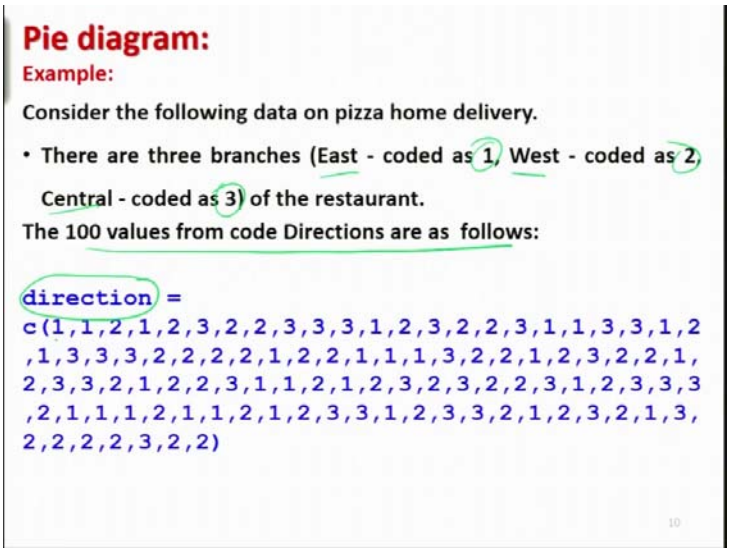

And in this case if I try to take here one more example the same example where I took the pizza home delivery data that there are 3 branches of a restaurant, which are located in the east, west and central part of the city and they are indicated by the codes as 1, 2 and 3 respectively and the handed values on their codes are collected as follows and they are stored in the data vector correction.

And the data is indicating that 100 people are trying to give the order of their food and their calls are received at a central place and then they try to determine that which of the branch can deliver the food quickly and that branch is delivering the food in that part of the city. So, these branches are serving like as branch number east etcetera.

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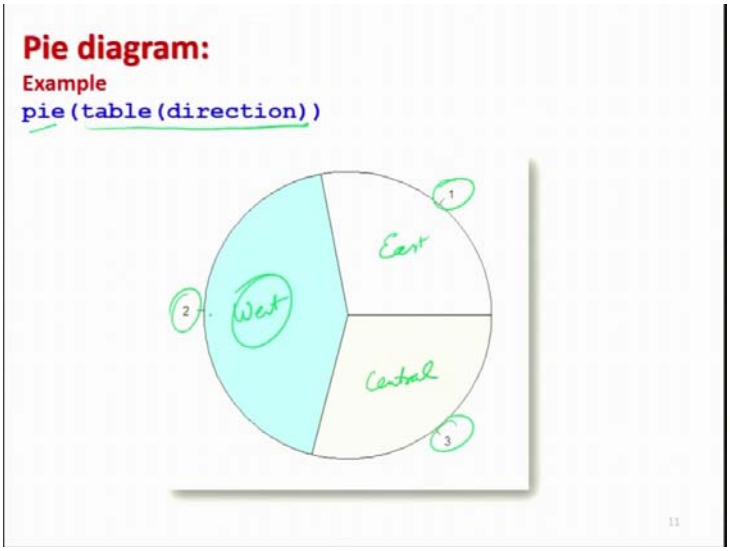

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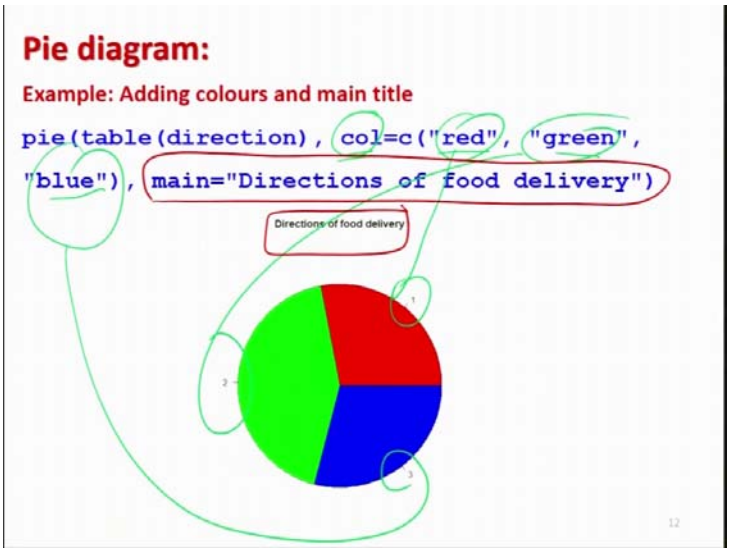


So, now if you try to create here the pie diagram of this data, it will look like this pie and then you have to write down here table direction. So, you this is your here east branch category 1, then you are here west branch category 2, and then you are here central brand category 3.

So, by looking at this one you can see that the western branch is supplying most of the pizza in the city and now after this, this is up to you how much you want to make this graphics informative and beautiful for example, you can add here color titles etc. for example, if you want to add the colors in the same pie diagram I will use the same command here col is equal to say here in the data vector red, green and blue.

So, that is going to change the colors of the segments in the same order in which the colors are written under the option here col you can see here first is here red. So, then here category 1 is here red, then it is here green. So, the second category here is green and then the third one third category here is a blue and then after that you have given here the main title under the option main m a i n and this title is given here, right.

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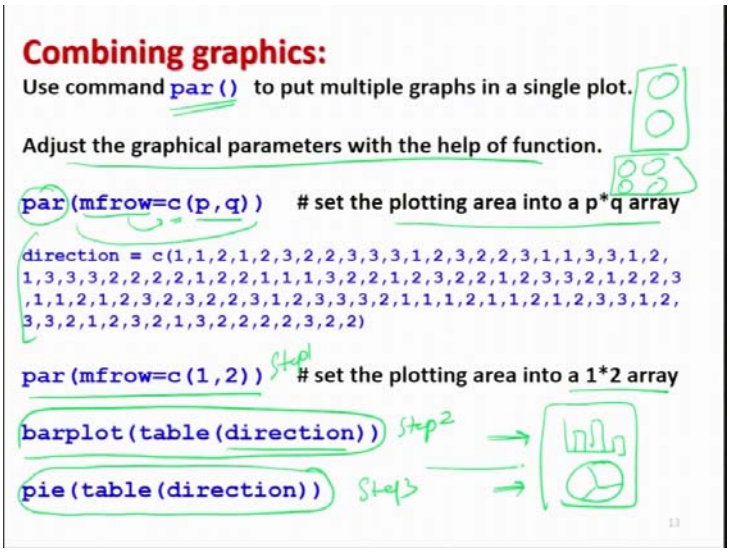


So, you can see here it is not a very different job to do it, but let me try to first show you these pie diagrams so, that you can be confident that it is not a very difficult thing to do, right.

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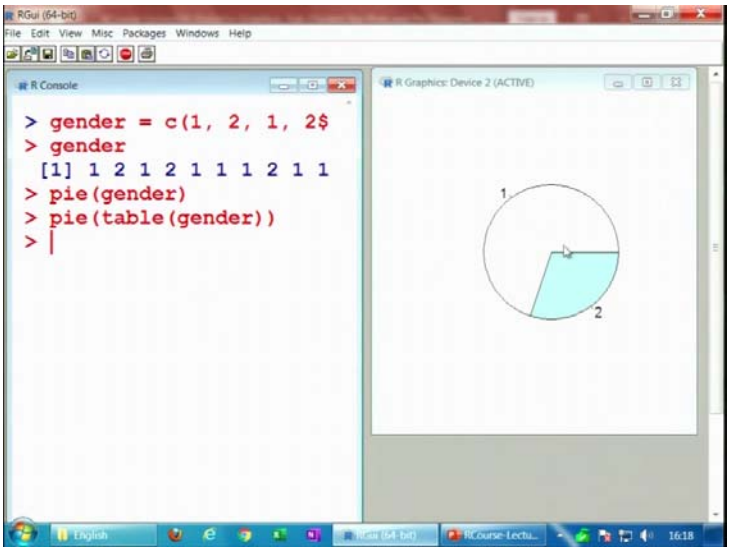


So, now let me try to clear the screen and try to create my data gender, you can see here this is my here gender and if you try to create here pie of gender surely it is going to

make a mistake here and you have to write down here see here table, right. If you want to write down here table this is going to be here like this, right.

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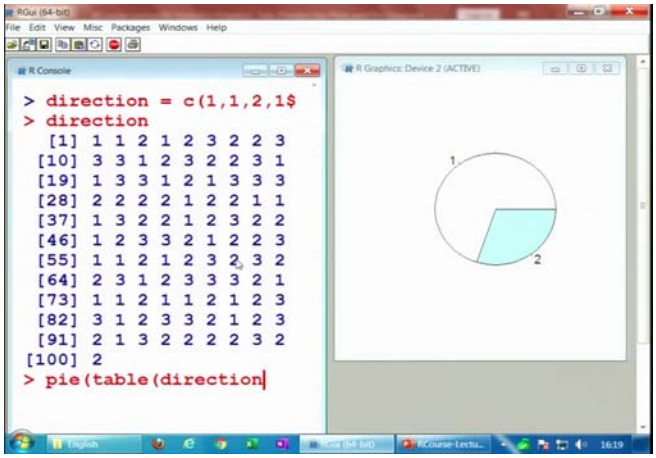


And similarly if you try to take here the data on this direction so, let me try to create here the data my head direction and if you try to create here the pie diagram with this stable direction this will look like this, right.

And if you try to made here make here these type of changes here, you can see here they can be made very easily say the main title is added here direction of food delivery, then these sections are given a name here I miss color here and if you want to give it here a name also that you can do very easily ok.

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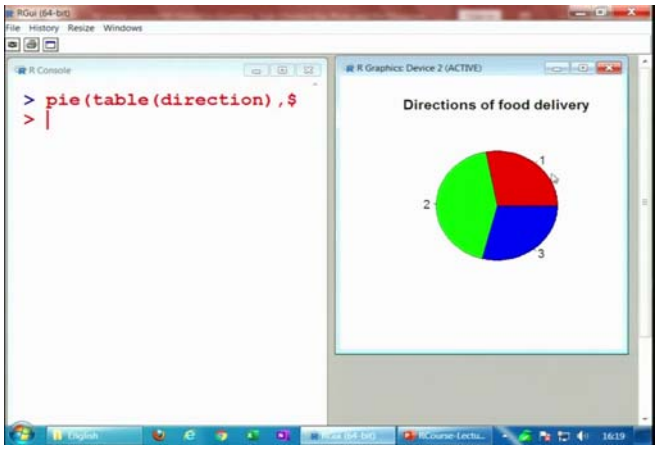

Now, after giving you these two graphics let me give you here a very important operation which is needed when you are trying to create such graphics. Many times you want to plot the graphics on the same page for example, you can have like as here this is your page you want to have one graphic here one graphic here.

And similarly, if you want means you can also do like that one graphic here one here one here one here. So, now, how to put multiple graphics in a single plot, so for that we try to use here a command p a r and then inside the parenthesis we try to give here a command here mfrow were all in lowercase alphabets.

And this will adjust the graphical parameters and we can create the graphics on the same page for example, we give the value here mfrow is equal to c that is data vector and then p comma q and then after that you write here p a r par and then within parenthesis this mfrow is equal to c p, q. So, this is going to create the plotting in a p cross q array, right. So, let me try to take here an example and try to show you that how you can get it, right?

So, what I try to do here that you have recently used the data on correction and I want to first create here a bar plot on the data and then I want to put the pie diagram of the same data on the same piece like this. So, you can see here that I want to make here a column of 2 photographs or I can say that there are 2 rows in 1 column.

So, the way you want means I just want to show you how it works. So, I try to consider here the same data set on that direction which I have just use it and then after that I give here the option here par mfrow is equal to c 1 comma 2. So, this will create a plotting area of 1 cross 2 array.

After this my second step this is my here is step 1, then my step 2 will be that I try to create the first plot. Suppose here this is the bar plot of the data in the direction and then after this in the step 3, I try to create here the data of the pie chart and if you try to do it in this sequence then it will create this type of graphic.

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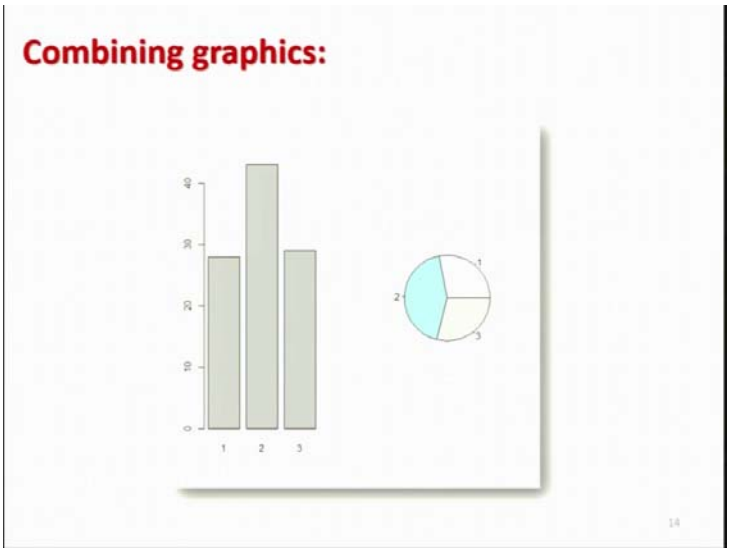


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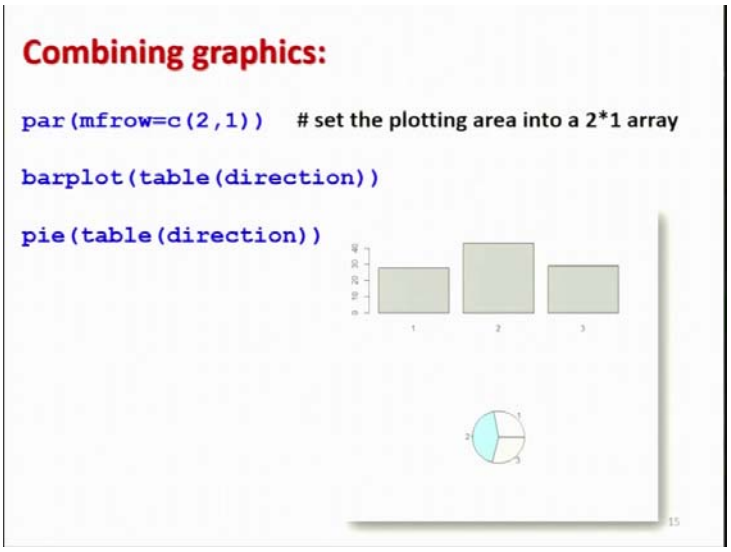


So, and if you try to see here you will get here this type of graphic and then later on I will show you that if you try to take here mfc 2 1 then you will get here this type of graphic, the same means bar plot and pie chart they will be arranged like this. So, let me try to show you these things on the R console which is more interesting here.

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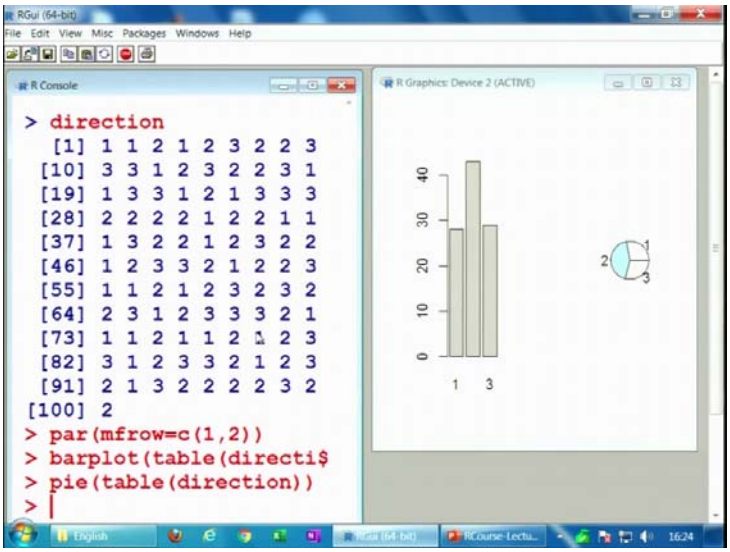


So, I try to create here this bar, right. This direction data is already here actually here. So, I do not need to I can show you here. This is your here direction data, right and I will just clean this graphical window so, that it looks completely fresh and now I try to create here a this I will execute step number 1 like this.

Now you can see here it has created this screen which is here completely blank now what I do here? I try to take here the first command here which is bar plot and I try to give it here you can see here as soon as I give this command here and execute it the bar plot is created here.

And in case if you want to create a pie chart. So, then after in the next command try to give here the command for the pie chart and you can see here this pie chart is created here, right. So, I try to close this thing here and I try to redo the things that now I try to change my here this parameter here mfrow to be here instead of 1 comma 2 I try to give you here 2 comma 1, right. So, you can see here this has created this type of blank space for the graphics.

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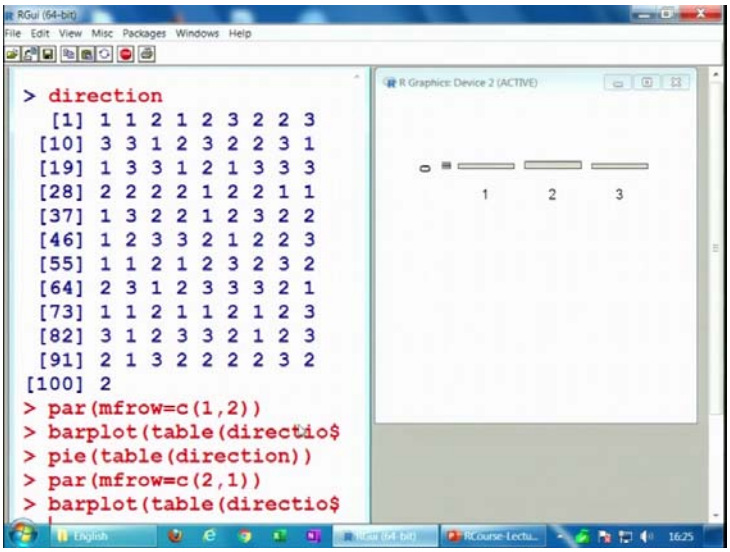


And now if you try to see here I try to give here the let me try to give here this command bar plot and you can see here as soon as you enter, this gives you here the bar plot here like this, right let me try to clear the screen, ok.

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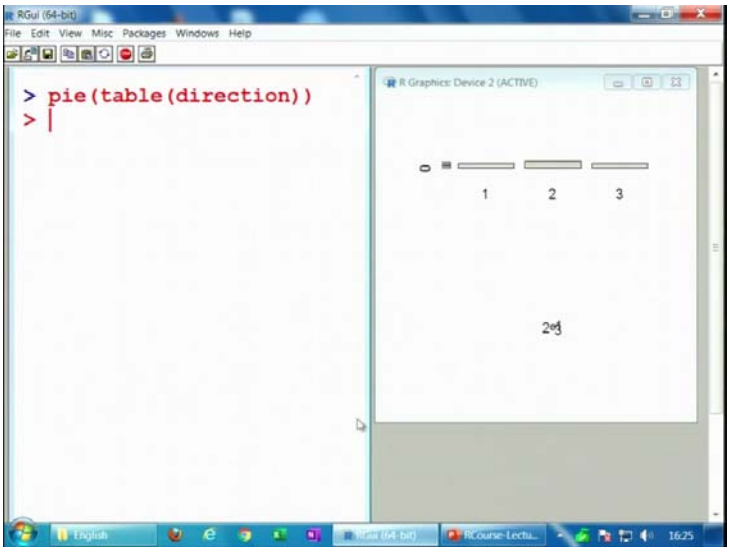


Let me try to clear the screen and then after that if you try to give here the command for that pie chart this pie chart will come here. Yes. You can control the size of this graphics also very easily because I have reduced this graphic size window and all these things

otherwise; it will look here just like here this, right. So, now, I try to conclude this lecture and I come to an end to this lecture and you can see this was a pretty simple lecture in which I have just given you 2 types of graphics.

One is about the subdivided bar plot and then the pie chart which and both are quite popular quite useful and after that I have given you 1 very important aspect that how you can combine different this graphics on a single sheet. So, for that the command is the same and the more important part was how are you going to execute the command, right. So, the way you if you try to execute the first graphic then it will come on the first place and after that if you click for the second graphic the second graphic will come in the second page.

And then I have taken here the command of only two graphics in a page you can take any number 2 by 2 2 by 3 and so on. And try to create more graphics and try to put them in a single place and then try to adjust the size of the graphics these are the different options which are available here which are perfectly in your control. So, you try to practice it take some example and try to learn these graphics and I will see you in the next lecture with more graphics, till then good bye.